

**WHAT IS CLAIMED IS:**

1. A catalyst for the full oxidation of volatile organic compounds (VOC), particularly hydrocarbons, and of CO to CO<sub>2</sub>, comprising:

5 a non-stoichiometric crystalline compound conventionally designated by a formula which corresponds to A<sub>14</sub>Cu<sub>24</sub>O<sub>41</sub> (I), where A is Sr or a solid solution of Sr with alkaline-earth metals, alkaline metals, lanthanides; or a non-stoichiometric crystalline compound conventionally designated by a formula which corresponds to B<sub>4</sub>Cu<sub>5</sub>O<sub>10</sub> (II), where B is Ca or a solid solution of Ca with alkaline-earth metals, alkaline metals, lanthanides; or  
10 mixtures thereof; and in that it is prepared in a form which has a large specific surface area, preferably larger than 25 m<sup>2</sup>/g.

2. The catalyst according to claim 1, further comprising a substrate material.

3. The catalyst according to claim 2, wherein the substrate material is a  
15 porous inert material.

4. The catalyst according to claim 3, wherein said porous inert substrate comprises a material chosen from the group constituted by Al<sub>2</sub>O<sub>3</sub>, ZrO<sub>2</sub>, CeO<sub>2</sub>, TiO<sub>2</sub>, MgO.

5. The catalyst according to claim 1, in form of granules.

20 6. The catalyst according to claim 2, wherein said substrate is an inert substrate in the form of a thin film.

7. The catalyst according to claim 2, wherein said substrate is a composite material.

8. The catalyst according to claim 1, comprising 5% to 20% by weight of  
25 a non-stoichiometric crystalline compound conventionally designated by a formula which corresponds to A<sub>14</sub>Cu<sub>24</sub>O<sub>41</sub> (I), where A is Sr or a solid solution of Sr with alkaline-earth metals, alkaline metals, lanthanides; or a non-stoichiometric crystalline compound conventionally designated by a formula which corresponds to B<sub>4</sub>Cu<sub>5</sub>O<sub>10</sub> (II); where B is Ca or a solid  
30 solution of Ca with alkaline-earth metals, alkaline metals, lanthanides; or

mixtures thereof.

9. A method for full oxidation of volatile organic compounds (VOC), particularly hydrocarbons, wherein a catalyst according to claims 1 to 8 is used.

5 10. A method for converting carbon monoxide to carbon dioxide, wherein a catalyst according to claim 1 is used.

11. A method for preparing a catalyst comprising a non-stoichiometric crystalline compound conventionally designated by a formula which corresponds to  $\text{Sr}_{14}\text{Cu}_{24}\text{O}_{41}$ , comprising the steps of:

- 10 a) immersing a pre-dried granular porous substrate material in an aqueous solution with a molar concentration of  $\text{Sr}(\text{NO}_3)_2$  from 0.23 M to 0.93 M and a molar concentration of  $\text{Cu}(\text{NO}_3)_2$  from 0.39 M to 1.59 M;
- b) drying at a temperature from 80°C to 120°C;
- c) holding at a temperature from 650°C to 750°C in a gas stream which  
15 contains oxygen until complete decomposition of the nitrates occurs.

12. A method for preparing a catalyst comprising a non-stoichiometric crystalline compound conventionally designated by a formula which corresponds to  $\text{Ca}_4\text{Cu}_5\text{O}_{10}$ , comprising the steps of:

- 20 a) immersing a pre-dried granular porous substrate material in an aqueous solution of  $\text{Ca}(\text{NO}_3)_2$  and  $\text{Cu}(\text{NO}_3)_2$  in an equimolar ratio and at a molar concentration from 0.39 M to 1.39 M;
- b) drying at a temperature from 80°C to 120°C;
- c) holding at a temperature from 650°C to 750°C in a gas stream which contains oxygen until complete decomposition of the nitrates occurs.

25 13. A method for preparing a catalyst comprising a non-stoichiometric crystalline compound conventionally designated by a formula which corresponds to  $\text{Ca}_4\text{Cu}_5\text{O}_{10}$ , comprising the steps of:

- a) immersing a pre-dried granular porous substrate material in an aqueous solution obtained by dissolving, with the application of heat, CuO and  $\text{CaCO}_3$  in nitric acid, so that the molar ratio between the components of  
30

the solution is  $\text{CuO} : \text{CaCO}_3 : \text{HNO}_3 = 1 : 0.83 : 3.2$ ; water and citric acid being added thereto so that the citric acid : Cu molar ratio is from 3.5:1 to 4.0:1;

b) heating in air until combustion of the organic fraction of the absorbed  
5 material is achieved;

c) thermal treatment for 4 to 24 hours at a temperature from 650 to 750°C in a stream of gas containing oxygen.

14. The method according to claim 11, wherein the porous material is constituted by  $\text{Al}_2\text{O}_3$ ,  $\text{ZrO}_2$ ,  $\text{CeO}_2$ ,  $\text{TiO}_2$ ,  $\text{MgO}$ .